C'

SEQUENCE LISTING

<110> Stephen M. Allen
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Jonathan E. Lightner
Guo-Hua Miao
J. Antoni Rafalski
Catherine J. Thorpe

<120> Plant Cellulose Synthases

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Val Tyr Pro Ile Thr Ser Leu Pro Leu Ile Ala Tyr Cys Val Leu Pro
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Ala Ile Cys Leu Leu Thr Asn Lys Phe Ile Ile Pro Glu Ile Ser Asn
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Gly Ile Leu Glu Leu Arg Trp Ser Gly Val Gly Ile Glu Asp Trp Trp
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Arg Asn Glu Gln Phe Trp Val Ile Gly Gly Thr Ser Ala His Leu Phe
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Ala Val Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Ile Asp Thr Asn
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Phe Thr Val Thr Ser Lys Ala Asn Asp Glu Asp Gly Asp Phe Ala Glu
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Leu Tyr Val Phe Lys Trp Thr Ser Leu Leu Ile Pro Pro Thr Thr Val
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Leu Val Ile Asn Leu Val Gly Met Val Ala Gly Ile Ser Tyr Ala Ile
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Asn Ser Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe
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Ser Ile Trp Val Ile Leu His Leu Tyr Pro Phe Leu Lys Gly Leu Met
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Gly Lys Gln Asn Arg Thr Pro Thr Ile Val Ile Val Trp Ser Ile Leu
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Pro Gly Ile Trp Arg Ser Gly Ser Ala Arg Gly Met Glu Ala Ser Ala
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Gly Leu Val Ala Gly Ser His Asn Arg Asn Glu Leu Val Val Ile Arg
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Arg Asp Gly Glu Pro Gly Pro Lys Pro Met Asp Gln Arg Asn Gly Gln
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Val Cys Gln Ile Cys Gly Asp Asp Val Gly Arg Asn Pro Asp Gly Glu
100 105 110

Pro Phe Val Ala Cys Asn Glu Cys Ala Phe Pro Ile Cys Arg Asp Cys
115 120 125

Tyr Glu Tyr Glu Arg Arg Glu Gly Thr Gln Asn Cys Pro Gln Cys Lys
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Lys His Asp Ser Gln Tyr Leu Ala Glu Ser Met Leu His Ala His Met
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Ile Pro Pro Asp Gln His Ala Leu Val Pro Ser Phe Val Gly Gly Gly
225                 230                 235                 240

Gly Lys Arg Ile His Pro Leu Pro Tyr Ala Asp Pro Asn Leu Pro Val
                245                 250                 255

Gln Pro Arg Ser Met Asp Pro Ser Lys Asp Leu Ala Ala Tyr Gly Tyr
            260                 265                 270

Gly Ser Val Ala Trp Lys Glu Arg Met Glu Ser Trp Lys Gln Lys Gln
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Glu Arg Met His Gln Thr Arg Asn Asp Gly Gly Gly Asp Asp Gly Asp
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Asp Ala Asp Leu Pro Leu Met Asp Glu Ala Arg Gln Pro Leu Ser Arg
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Lys Ile Pro Leu Pro Ser Ser Gln Ile Asn Pro Tyr Arg Met Ile Ile
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Ile Ile Arg Leu Val Val Leu Cys Phe Phe Phe His Tyr Arg Val Met
            340                 345                 350

His Pro Val Pro Asp Ala Phe Ala Leu Trp Leu Ile Ser Val Ile Cys
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Glu Ile Trp Phe Ala Met Ser Trp Ile Leu Asp Gln Phe Pro Lys Trp
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Phe Pro Ile Glu Arg Glu Thr Tyr Leu Asp Arg Leu Ser Leu Arg Phe
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Asp Lys Glu Gly His Pro Ser Gln Leu Ala Pro Val Asp Phe Phe Val
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Ser Thr Val Asp Pro Leu Lys Glu Pro Pro Leu Val Thr Ala Asn Thr
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Val Leu Ser Ile Leu Ser Val Asp Tyr Pro Val Asp Lys Val Ser Cys
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Tyr Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe Glu Ala Leu Ser
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Glu Thr Ser Glu Phe Ala Lys Lys Trp Val Pro Phe Cys Lys Arg Tyr
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Ser Leu Glu Pro Arg Ala Pro Glu Trp Tyr Phe Gln Gln Lys Ile Asp
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Tyr Leu Lys Asp Lys Val Ala Pro Asn Phe Val Arg Glu Arg Arg Ala
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Met Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Leu Val
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Ala Lys Ala Gln Lys Val Pro Glu Glu Gly Trp Thr Met Gln Asp Gly
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Thr Pro Trp Pro Gly Asn Asn Val Arg Asp His Pro Gly Met Ile Gln
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Val Phe Leu Gly Gln Ser Gly Gly His Asp Val Glu Gly Asn Glu Leu
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Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly Tyr Asn His
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His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Val Ser Ala Val
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Leu Thr Asn Ala Pro Tyr Leu Leu Asn Leu Asp Cys Asp His Tyr Ile
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Asn Asn Ser Lys Ala Ile Lys Glu Ala Met Cys Phe Met Met Asp Pro
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Gly Thr Gly Cys Val Phe Arg Arg Gln Ala Leu Tyr Gly Tyr Asp Ala
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Trp Cys Ile Cys Cys Cys Cys Phe Gly Asn Arg Lys Thr Lys Lys Lys
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Cys Ile Pro Lys Arg Ala Ala Phe Lys Gly Ser Ala Pro Leu Asn Leu
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Ile Phe Phe Ser Asn His Cys Pro Leu Trp Tyr Gly Tyr Gly Gly Gly
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Leu Lys Phe Leu Glu Arg Phe Ser Tyr Ile Asn Ser Ile Val Tyr Pro
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Arg Thr Pro Thr Ile Val Ile Val Trp Ser Ile Leu Leu Ala Ser Ile
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Ile Asn Leu Ser Asp Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly
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Ser Val Glu Ile Phe Met Ser Arg His Cys Pro Leu Trp Tyr Ala Tyr
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Gly Gly Arg Leu Lys Trp Leu Glu Arg Phe Ala Tyr Thr Asn Thr Ile
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Val Tyr Pro Phe Thr Ser Ile Pro Leu Leu Ala Tyr Cys Thr Ile Pro
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Arg Asn Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ala His Leu Phe
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Ala Val Phe Gln Gly Phe Leu Lys Val Leu Gly Gly Val Asp Thr Ser
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Phe Thr Val Thr Ser Lys Ala Ala Gly Asp Glu Ala Asp Ala Phe Gly
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Asp Leu Tyr Leu Phe Lys Trp Thr Thr Leu Leu Val Pro Pro Thr Thr
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Leu Ile Ile Ile Asn Met Val Gly Ile Val Ala Gly Val Ser Asp Ala
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Val Asn Asn Gly Tyr Gly Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe
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Phe Ser Phe Trp Val Ile Val His Leu Tyr Pro Phe Leu Lys Gly Leu
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Gln Ile Cys Gly Asp Glu Val Gly Val Gly Phe Asp Gly Glu Pro Phe
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Tyr Lys Arg Leu Lys Gly Cys Pro Arg Val Ala Gly Asp Glu Glu Glu
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Asp Gly Val Asp Asp Leu Glu Gly Glu Phe Gly Leu Gln Asp Gly Ala
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Ala His Glu Asp Asp Pro Gln Tyr Val Ala Glu Ser Met Leu Arg Ala
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Gln Met Ser Tyr Gly Arg Gly Gly Asp Ala His Pro Gly Phe Ser Pro
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Val Pro Asn Val Pro Leu Leu Thr Asn Gly Gln Met Val Asp Asp Ile
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Pro Pro Glu Gln His Ala Leu Val Pro Ser Tyr Met Ser Gly Gly Gly
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Gly Gly Gly Lys Arg Ile His Pro Leu Pro Phe Ala Asp Pro Asn Leu
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Tyr Asn His His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Val
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Tyr Cys Ile Pro Lys Arg Pro Ala Phe Lys Gly Ser Ala Pro Leu Asn
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Cys Pro Gln Cys Lys Thr Arg Tyr Lys Arg Leu Lys Gly Cys Gln Arg
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Arg Met Ile Ile Ile Ile Arg Leu Val Val Leu Gly Phe Phe Phe His
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Tyr Arg Val Met His Pro Val Asn Asp Ala Phe Ala Leu Trp Leu Ile
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Cys Lys Arg Tyr Asn Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Gln
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Gly Tyr Asn His His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg
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Asp His Tyr Ile Asn Asn Ser Lys Ala Ile Lys Glu Ala Met Cys Phe
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Trp Val Ile Val His Leu Tyr Pro Phe Leu Lys Gly Leu Val Gly Arg
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Gln Asn Arg Thr Pro Thr Ile Val Ile Val Trp Ser Ile Leu Leu Ala
1045 1050 1055

Ser Ile Phe Ser Leu Leu Trp Val Arg Ile Asp Pro Phe Leu Ala Lys
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35 40 45

Ala Gly Ala Glu Val Thr Arg Asn Ala Val Val Glu Ala Ala Arg Phe
50 55 60

Ala Ala Leu Trp Val Ser Phe Cys Arg Lys His Gly Val Glu Pro Arg
65 70 75 80

Asn Leu Glu Ala Tyr Phe Asn Ala Gly Glu Gly Gly Gly Gly Lys Ala
85 90 95

Lys Val Val Ala Arg Gly Ser Tyr Arg Gly Met Ala Trp Pro Glu Leu
100 105 110

Val Arg Asp Arg Arg Arg Val Arg Arg Glu Tyr Glu Glu Met Arg Leu
115 120 125

Arg Ile Asp Ala Leu Gln Ala Ala Asp Ala Arg Arg Arg Arg Arg Gly
130 135 140

Ala Ala Asp Asp His Ala Gly Val Val Gln Val Leu Ile Asp Phe Ala

145 150 155 160

Gly Ser Val Pro Gln Leu Gly Val Ala Asn Gly Ser Lys Leu Ile Asp
165 170 175

Val Ala Ser Val Asp Val Cys Leu Pro Ala Leu Val Tyr Val Cys Arg
180 185 190

Glu Lys Arg Arg Gly His Ala His His Arg Lys Ala Gly Ala Met Asn
195 200 205

Ala Pro Phe Ile Leu Asp Leu Asp Cys Asp Tyr Tyr Val Asn Asn Ser
210 215 220

Gln Ala Leu Arg Ala Gly Ile Cys Phe Met Ile Glu Arg Gly Gly Gly
225 230 235 240

Gly Ala Ala Glu Asp Ala Gly Ala Val Ala Phe Val Gln Phe Pro Gln
245 250 255

Arg Val Asp Gly Val Asp Pro Gly Asp Arg Tyr Ala Asn His Asn Arg
260 265 270

Val Leu Phe Asp Cys Thr Glu Leu Gly Leu Asp Gly Leu Gln Gly Pro
275 280 285

Ile Tyr Val Gly Thr Gly Cys Leu Phe Arg Arg Val Ala Leu Tyr Ser
290 295 300

Val Asp Leu Pro Arg Trp Arg Pro Arg Arg Ser Leu Gly Cys Arg Leu
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Leu Ser Gly Pro Arg
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Asp Gly Gln Val Cys Glu Ile Cys Gly Asp Gly Val Gly Leu Thr Val
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Asp Gly Asp Leu Phe Val Ala Cys Asn Glu Cys Gly Phe Pro Val Cys
    50                  55                  60

Arg Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Ser His Leu Cys Pro
65                  70                  75                  80

Gln Cys Lys Thr Arg Tyr Lys Arg Leu Lys Gly Ser Pro Arg Val Glu
                85                  90                  95

Gly Asp Asp Asp Glu Glu Asp Val Asp Asp Ile Glu His Glu Phe Asn
            100                 105                 110

Ile Asp Glu Gln Lys Asn Lys His Gly Gln Val Ala Glu Ala Met Leu
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His Gly Arg Met Ser Tyr Gly Arg Gly Pro Glu Asp Asp Asp Asn Ser
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Gln Phe Pro Thr Pro Val Ile Ala Gly Gly Arg Ser Arg Pro Val Ser
145                 150                 155                 160

Gly Glu Phe Pro Ile Ser Ser Asn Ala Tyr Gly Asp Gln Met Leu Ser
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Ser Ser Leu His Lys Arg Val His Pro Tyr Pro Val Ser Glu Pro Gly
            180                 185                 190

Ser Ala Arg Trp Asp Glu Lys Lys Xaa Asp Gly Trp Lys Asp Arg Met
        195                 200                 205

Asp Asp Trp Lys Leu Gln Gln Gly Asn Leu Gly Pro Glu Pro Asp Glu
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Asp Pro Asp Ala Ala Met Leu Asp Glu Ala Arg Gln Pro Leu Ser Arg
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Lys Val Pro Ile Ala Ser Ser Lys Ile Asn Pro Tyr Arg Met Val Ile
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Val Ala Arg Leu Val Ile Leu Ala Phe Phe Leu Arg Tyr Arg Leu Met
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Asn Pro Val His Asp Ala Leu Gly Leu Trp Leu Thr Ser Ile Ile Cys
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Glu Ile Trp Phe Ala Phe Ser Trp Ile Leu Asp Gln Phe Pro Lys Trp
    290                 295                 300
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Phe Pro Ile Asp Arg Glu Thr Tyr Leu Asp Arg Leu Ser Ile Arg Tyr
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Glu Arg Glu Gly Glu Pro Asn Met Leu Ala Pro Val Asp Val Phe Val
325 330 335

Ser Thr Val Asp Pro Met Lys Glu Pro Pro Leu Val Thr Ala Asn Thr
340 345 350

Val Leu Ser Ile Leu Ala Met Asp Tyr Pro Val Asp Lys Ile Ser Cys
355 360 365

Tyr Ile Ser Asp Asp Gly Ala Ser Met Cys Thr Phe Glu Ser Leu Ser
370 375 380

Glu Thr Ala Glu Phe Ala Arg Lys Trp Val Pro Phe Cys Lys Lys Phe
385 390 395 400

Ser Ile Glu Pro Arg Ala Pro Glu Met Tyr Phe Ser Glu Lys Ile Asp
405 410 415

Tyr Leu Lys Asp Lys Val Gln Pro Thr Phe Val Lys Glu Arg Arg Ala
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Met Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Leu Val
435 440 445

Ala Lys Ala Gln Lys Val Pro Gln Gly Gly Trp Ile Met Gln Asp Gly
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Thr Pro Trp Pro Gly Asn Asn Thr Lys Asp His Pro Gly Met Ile Gln
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Val Phe Leu Gly Ser Ser Gly Gly Leu Asp Thr Glu Gly Asn Gln Leu
485 490 495

Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly Phe Gln His
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His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Val Ser Ala Val
515 520 525

Leu Thr Asn Ala Pro Phe Met Leu Asn Leu Asp Cys Asp His Tyr Val
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Asn Asn Ser Lys Ala Ala Arg Glu Ala Met Cys Phe Leu Met Asp Pro
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Gln Thr Gly Lys Lys Val Cys Tyr Val Gln Phe Pro Gln Arg Phe Asp
565 570 575

Gly Ile Asp Thr His Asp Arg Tyr Ala Asn Arg Asn Thr Val Phe Phe
580 585 590

Asp Ile Asn Met Lys Gly Leu Asp Gly Ile Gln Gly Pro Val Tyr Val
595 600 605

Gly Thr Gly Cys Val Phe Arg Arg Gln Ala Leu Tyr Gly Tyr Asn Pro
610 615 620

Pro Lys Gly Pro Lys Arg Pro Lys Met Val Ser Cys Asp Cys Cys Pro
625 630 635 640

Cys Phe Gly Ser Arg Lys Lys Tyr Lys Glu Lys Asn Asp Ala Asn Gly
645 650 655

Glu Ala Ala Ser Leu Lys Gly Met Asp Asp Asp Lys Glu Val Leu Met
660 665 670

Ser Gln Met Asn Phe Glu Lys Lys Phe Gly Gln Ser Ser Ile Phe Val
675 680 685

Thr Ser Thr Leu Met Glu Glu Gly Gly Val Pro Pro Ser Ser Ser Pro
690 695 700

Ala Ala Leu Leu Lys Glu Ala Ile His Val Ile Ser Cys Gly Tyr Glu
705 710 715 720

Asp Lys Thr Glu Trp Gly Leu Glu Leu Gly Trp Ile Tyr Gly Ser Ile
725 730 735

Thr Glu Asp Ile Leu Thr Gly Phe Lys Met His Cys Arg Gly Trp Arg
740 745 750

Ser Ile Tyr Cys Met Pro Lys Arg Ala Ala Phe Lys Gly Thr Ala Pro
755 760 765

Ile Asn Leu Ser Asp Arg Leu Asn Gln Val Leu Arg Trp Ala Leu Gly
770 775 780

Ser Ile Glu Ile Phe Phe Ser His His Cys Pro Leu Trp Tyr Gly Phe
785 790 795 800

Lys Glu Lys Lys Leu Lys Trp Leu Glu Arg Phe Ala Tyr Ala Asn Thr
805 810 815

Thr Val Tyr Pro Phe Thr Ser Ile Pro Leu Val Ala Tyr Cys Ile Leu
820 825 830

Pro Ala Val Cys Leu Leu Thr Asp Lys Phe Ile Met Pro Pro Ile Ser
835 840 845

Thr Phe Ala Gly Leu Tyr Phe Val Ala Leu Phe Ser Ser Ile Ile Ala
850 855 860

Thr Gly Ile Leu Glu Leu Lys Trp Ser Gly Val Ser Ile Glu Glu Trp
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Trp Arg Asn Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ala His Leu
885 890 895

Phe Ala Val Ile Gln Gly Leu Leu Lys Val Leu Ala Gly Ile Asp Thr
900 905 910

Asn Phe Thr Val Thr Ser Lys Ala Thr Asp Asp Glu Glu Phe Gly Glu
915 920 925

Leu Tyr Thr Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Ile
930 935 940

Leu Ile Ile Asn Ile Val Gly Val Val Ala Gly Ile Ser Asp Ala Ile
945 950 955 960

Asn Asn Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe
965 970 975

Ser Phe Trp Val Ile Val His Leu Tyr Pro Phe Leu Lys Gly Leu Met
980 985 990

Gly Arg Gln Asn Arg Thr Pro Thr Ile Val Val Ile Trp Ser Val Leu
995 1000 1005

Leu Ala Ser Ile Phe Ser Leu Leu Trp Val Arg Ile Asp Pro Phe Val
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Val Phe Leu Gly His Ser Gly Gly Leu Asp Thr Asp Gly Asn Glu Leu
35 40 45

Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly Phe Gln His
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His Lys Lys Ala Gly Ala Met Asn Ala Leu Ile Arg Val Ser Ala Val
65 70 75 80

Leu Thr Asn Gly Ala Tyr Leu Leu Asn Val Asp Cys Asp His Tyr Phe
85 90 95

Asn Asn Ser Lys Ala Leu Lys Glu Ala Met Cys Phe Met Met Asp Pro
100 105 110

Val Leu Gly Lys Lys Thr Cys Tyr Val Gln Phe Pro Gln Arg Phe Asp
115 120 125

Gly Ile Asp Leu His Asp Arg Tyr Ala Asn Arg Asn Ile Val Phe Phe
130 135 140

Asp Ile Asn Met Lys Gly Gln Asp Gly Val Gln Gly Pro Val Tyr Val
145 150 155 160

Gly Thr Gly Cys Cys Phe Asn Arg Gln Ala Leu Tyr Gly Tyr Asp Pro
165 170 175

Val Leu Thr Glu Glu Asp Leu Glu Pro Asn Ile Ile Val Lys Ser Cys
180 185 190

Cys Gly Ser Arg Lys Lys Gly Lys Gly Gly Asn Lys Lys Tyr Ser Asp
195 200 205

Lys Lys Lys Ala Met Gly Arg Thr Glu Ser Thr Val Pro Ile Phe Asn

210 215 220

Met Glu Asp Ile Glu Glu Gly Val Glu Gly Tyr Asp Asp Glu Arg Thr
225 230 235 240

Leu Leu Met Ser Gln Lys Ser Leu Glu Lys Arg Phe Gly Gln Ser Pro
245 250 255

Val Phe Ile Ala Ala Thr Phe Met Glu Gln Gly Gly Ile Pro Pro Ser
260 265 270

Thr Asn Pro Ala Thr Leu Leu Lys Glu Ala Ile His Val Ile Ser Cys
275 280 285

Gly Tyr Glu Asp Lys Thr Glu Trp Gly Lys Glu Ile Gly Trp Ile Tyr
290 295 300

Gly Ser Val Thr Glu Asp Ile Leu Thr Gly Phe Lys Met His Ala Arg
305 310 315 320

Gly Trp Ile Ser Ile Tyr Cys Met Pro Pro Arg Pro Ala Phe Lys Gly
325 330 335

Ser Ala Pro Ile Asn Leu Ser Asp Arg Leu Asn Gln Val Leu Arg Trp
340 345 350

Ala Leu Gly Ser Ile Glu Ile Phe Leu Ser Arg His Cys Pro Leu Trp
355 360 365

Tyr Gly Tyr Asn Gly Lys Leu Lys Pro Leu Met Arg Leu Ala Tyr Ile
370 375 380

Asn Thr Ile Val Tyr Pro Phe Thr Ser Ile Pro Leu Ile Ala Tyr Cys
385 390 395 400

Thr Leu Pro Ala Phe Cys Leu Leu Thr Asn Lys Phe Ile Ile Pro Glu
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Ile Ser Asn Phe Ala Ser Met Trp Phe Ile Leu Leu Phe Val Ser Ile
420 425 430

Phe Thr Thr Ser Ile Leu Glu Leu Arg Trp Ser Gly Val Ser Ile Glu
435 440 445

Asp Trp Trp Arg Asn Glu Gln Phe Trp Val Ile Gly Gly Thr Ser Ala
450 455 460

His Leu Phe Ala Val Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Ile
465 470 475 480

Asp Thr Asn Phe Thr Val Thr Ser Lys Ala Ser Asp Glu Asp Gly Asp
485 490 495

Phe Ala Glu Leu Tyr Val Phe Lys Trp Thr Ser Leu Leu Ile Pro Pro
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Thr Thr Val Leu Ile Val Asn Leu Val Gly Ile Val Ala Gly Val Ser

515 520 525

Tyr Ala Ile Asn Ser Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys
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Leu Phe Phe Ala Ile Trp Val Ile Ala His Leu Tyr Pro Phe Leu Lys
545 550 555 560

Gly Leu Leu Gly Arg Gln Asn Arg Thr Pro Thr Ile Val Ile Val Trp
565 570 575

Ser Val Leu Leu Ala Ser Ile Phe Ser Leu Leu Trp Val Arg Ile Asp
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Pro Phe Thr Ser Asp Ser Asn Lys Leu Thr Asn Gly Gln Cys Gly Ile
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Asn Cys
610

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aaaaaaaaaa 2890

<210> 18
<211> 793
<212> PRT
<213> Glycine max

<400> 18

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His Glu Leu His Pro Val Asn Asp Ala Tyr Gly Leu Trp Leu Thr Ser
  1               5                  10                  15

Val Ile Cys Glu Ile Trp Phe Ala Val Ser Trp Ile Met Asp Gln Phe
             20                  25                  30

Pro Lys Trp Tyr Pro Ile Gln Arg Glu Thr Tyr Leu Asp Arg Leu Ser
         35                  40                  45

Leu Arg Tyr Glu Lys Glu Gly Lys Pro Ser Glu Leu Ser Ser Val Asp
     50                  55                  60

Val Phe Val Ser Thr Val Asp Pro Met Lys Glu Pro Pro Leu Ile Thr
 65                  70                  75                  80

Ala Asn Thr Val Leu Ser Ile Leu Ala Val Asp Tyr Pro Val Asp Lys
                 85                  90                  95

Val Ala Cys Tyr Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe Glu
            100                 105                 110

Ala Leu Ser Glu Thr Ser Glu Phe Ala Arg Arg Trp Val Pro Phe Cys
        115                 120                 125

Lys Lys Tyr Asn Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Gly Gln
    130                 135                 140

Lys Met Asp Tyr Leu Lys Asn Lys Val His Pro Ala Phe Val Arg Glu
145                 150                 155                 160

Arg Arg Ala Met Lys Arg Asp Tyr Glu Glu Phe Lys Val Arg Ile Asn
                165                 170                 175
```

Ser Leu Val Ala Thr Ala Gln Lys Val Pro Glu Asp Gly Trp Thr Met
180 185 190

Gln Asp Gly Thr Pro Trp Pro Gly Asn Asn Val Arg Asp His Pro Gly
195 200 205

Met Ile Gln Val Phe Leu Gly Gln Asp Gly Val Arg Asp Val Glu Gly
210 215 220

Asn Glu Leu Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly
225 230 235 240

Phe Asp His His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Ala
245 250 255

Ser Ala Ile Ile Thr Asn Ala Pro Tyr Leu Leu Asn Val Asp Cys Asp
260 265 270

His Tyr Ile Asn Asn Ser Lys Ala Leu Arg Glu Ala Met Cys Phe Met
275 280 285

Met Asp Pro Gln Leu Gly Lys Lys Val Cys Tyr Val Gln Phe Pro Gln
290 295 300

Arg Phe Asp Gly Ile Asp Arg His Asp Arg Tyr Ser Asn Arg Asn Val
305 310 315 320

Val Phe Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Ile Gln Gly Pro
325 330 335

Ile Tyr Val Gly Thr Gly Cys Val Phe Arg Arg Tyr Ala Leu Tyr Gly
340 345 350

Tyr Asp Ala Pro Ala Lys Lys Lys Pro Pro Ser Lys Thr Cys Asn Cys
355 360 365

Trp Pro Lys Trp Cys Cys Leu Cys Cys Gly Ser Arg Lys Lys Lys Asn
370 375 380

Ala Asn Ser Lys Lys Glu Lys Lys Arg Lys Val Lys His Ser Glu Ala
385 390 395 400

Ser Lys Gln Ile His Ala Leu Glu Asn Ile Glu Ala Gly Asn Glu Gly
405 410 415

Thr Asn Asn Glu Lys Thr Ser Asn Leu Thr Gln Thr Lys Leu Glu Lys
420 425 430

Arg Phe Gly Gln Ser Pro Val Phe Val Ala Ser Thr Leu Leu Asp Asp
435 440 445

Gly Gly Val Pro His Gly Val Ser Pro Ala Ser Leu Leu Lys Glu Ala
450 455 460

Ile Gln Val Ile Ser Cys Gly Tyr Glu Asp Lys Thr Glu Trp Gly Lys
465 470 475 480

Glu Val Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu Thr Gly
485 490 495

Phe Lys Met His Cys His Gly Trp Arg Ser Val Tyr Cys Ile Pro Lys
500 505 510

Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp Arg Leu
515 520 525

His Gln Val Leu Arg Trp Ala Leu Gly Ser Val Glu Ile Phe Phe Ser
530 535 540

Arg His Cys Pro Ile Trp Tyr Gly Tyr Gly Gly Gly Leu Lys Leu Leu
545 550 555 560

Glu Arg Phe Ser Tyr Ile Asn Ser Val Val Tyr Pro Trp Thr Ser Leu
565 570 575

Pro Leu Leu Val Tyr Cys Thr Leu Pro Ala Ile Cys Leu Leu Thr Gly
580 585 590

Lys Phe Ile Val Pro Glu Ile Ser Asn Tyr Ala Ser Leu Val Phe Met
595 600 605

Ala Leu Phe Ile Ser Ile Ala Ala Thr Gly Ile Leu Glu Met Gln Trp
610 615 620

Gly Gly Val Ser Ile Asp Asp Trp Trp Arg Asn Glu Gln Phe Trp Val
625 630 635 640

Ile Gly Gly Val Ser Ser His Leu Phe Ala Leu Phe Gln Gly Leu Leu
645 650 655

Lys Val Leu Ala Gly Val Asn Thr Asn Phe Thr Val Thr Ser Lys Ala
660 665 670

Ala Asp Asp Gly Glu Phe Ser Glu Leu Tyr Ile Phe Lys Trp Thr Ser
675 680 685

Leu Leu Ile Pro Pro Met Thr Leu Leu Ile Met Asn Ile Val Gly Val
690 695 700

Val Val Gly Ile Ser Asp Ala Ile Asn Asn Gly Tyr Asp Ser Trp Gly
705 710 715 720

Pro Leu Phe Gly Arg Leu Phe Phe Ala Leu Trp Val Ile Leu His Leu
725 730 735

Tyr Pro Phe Leu Lys Gly Leu Leu Gly Lys Gln Asp Arg Met Pro Thr
740 745 750

Ile Ile Leu Val Trp Ser Ile Leu Leu Ala Ser Ile Leu Thr Leu Met
755 760 765

Trp Val Arg Ile Asn Pro Phe Val Ser Arg Asp Gly Pro Val Leu Glu
770 775 780

Ile Cys Gly Leu Asn Cys Asp Glu Ser
785 790

<210> 19
<211> 1733
<212> DNA
<213> Triticum aestivum

<220>
<221> unsure
<222> (262)
<223> n = a, c, g or t

<400> 19
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ccacaaaggt ttgatggtat tgataggaat gatcgatatg caaacaggaa cactgtcttt 120
tttgatatta acttgagggg ccttgacggc attcaaggac cagtttatgt gggaactggt 180
tgtgttttca acagaacggc tatctatggt tatgagcccc caattaaggc gaagaagcca 240
ggtttcttgg catcattatg tnggggcaag aagaaggcaa gcaagtcaaa gaaaaggagc 300
tcagataaga aaaagtcgaa caagcatgtg gacagttctg ttccagtatt caatctcgaa 360
gacatagagg agggtgttga aggtgctggg tttgatgatg agaaatcagt tctcatgtct 420
caaatgagct tagagaagag atttggccag tcagcagcat ttgttgcctc cactctgatg 480
gaatatggtg gtgttcctca gtcgtccact ccagaatctc ttttgaaaga agctatccat 540
gtcataagtt gtggctatga ggacaagtct gaatggggaa ctgagattgg ttggatctat 600
ggatctgtca cagaagatat tctaactgga ttcaagatgc acgcaagagg ctggcgttca 660
atctattgca tgcccaagcg cccagctttc aagggatctg cccccatcaa tctttcagat 720
cgtctgaatc aagtgctgcg gtgggctctt ggttctgttg aaattctttt cagccggcat 780
tgccccttat ggtatggcta cggagggcgc ctcaagttcc tggagagatt cgcttacatc 840
aacaccacca tttacccact aacctctctc ccgcttctag tctattgtat attgcctgct 900
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gagaaagttg tcaaaattga gaaaacacat ttgtaaatag atgtaataga ctatctaccg 1680
ttttcatgag gttaagctct tctttttgg aaaaaaaaaa aaaaaaaaaa aaa 1733

<210> 20
<211> 506
<212> PRT
<213> Triticum aestivum

<220>
<221> UNSURE
<222> (88)
<223> Xaa = any amino acid

<400> 20
Glu Ala Met Cys Phe Leu Met Asp Pro Asn Leu Gly Pro Gln Val Cys

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Tyr Val Gln Phe Pro Gln Arg Phe Asp Gly Ile Asp Arg Asn Asp Arg
            20                  25                  30

Tyr Ala Asn Arg Asn Thr Val Phe Phe Asp Ile Asn Leu Arg Gly Leu
        35                  40                  45

Asp Gly Ile Gln Gly Pro Val Tyr Val Gly Thr Gly Cys Val Phe Asn
    50                  55                  60

Arg Thr Ala Ile Tyr Gly Tyr Glu Pro Pro Ile Lys Ala Lys Lys Pro
65                  70                  75                  80

Gly Phe Leu Ala Ser Leu Cys Xaa Gly Lys Lys Lys Ala Ser Lys Ser
                85                  90                  95

Lys Lys Arg Ser Ser Asp Lys Lys Lys Ser Asn Lys His Val Asp Ser
            100                 105                 110

Ser Val Pro Val Phe Asn Leu Glu Asp Ile Glu Glu Gly Val Glu Gly
        115                 120                 125

Ala Gly Phe Asp Asp Glu Lys Ser Val Leu Met Ser Gln Met Ser Leu
    130                 135                 140

Glu Lys Arg Phe Gly Gln Ser Ala Ala Phe Val Ala Ser Thr Leu Met
145                 150                 155                 160

Glu Tyr Gly Gly Val Pro Gln Ser Ser Thr Pro Glu Ser Leu Leu Lys
                165                 170                 175

Glu Ala Ile His Val Ile Ser Cys Gly Tyr Glu Asp Lys Ser Glu Trp
            180                 185                 190

Gly Thr Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu
        195                 200                 205

Thr Gly Phe Lys Met His Ala Arg Gly Trp Arg Ser Ile Tyr Cys Met
    210                 215                 220

Pro Lys Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp
225                 230                 235                 240

Arg Leu Asn Gln Val Leu Arg Trp Ala Leu Gly Ser Val Glu Ile Leu
                245                 250                 255

Phe Ser Arg His Cys Pro Leu Trp Tyr Gly Tyr Gly Gly Arg Leu Lys
            260                 265                 270

Phe Leu Glu Arg Phe Ala Tyr Ile Asn Thr Thr Ile Tyr Pro Leu Thr
        275                 280                 285

Ser Leu Pro Leu Leu Val Tyr Cys Ile Leu Pro Ala Ile Cys Leu Leu
    290                 295                 300

Thr Gly Lys Phe Ile Met Pro Glu Ile Ser Asn Leu Ala Ser Ile Trp
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305 310 315 320

Phe Ile Ala Leu Phe Leu Ser Ile Phe Ala Thr Gly Ile Leu Glu Met
325 330 335

Arg Trp Ser Gly Val Gly Ile Asp Glu Trp Trp Arg Asn Glu Gln Phe
340 345 350

Trp Val Ile Gly Gly Ile Ser Ala His Leu Phe Ala Val Phe Gln Gly
355 360 365

Leu Leu Lys Val Leu Ala Gly Ile Asp Thr Asn Phe Thr Val Thr Ser
370 375 380

Lys Ala Asn Asp Glu Glu Gly Asp Phe Ala Glu Leu Tyr Met Phe Lys
385 390 395 400

Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Ile Leu Ile Ile Asn Met
405 410 415

Val Gly Val Val Ala Gly Thr Ser Tyr Ala Ile Asn Ser Gly Tyr Gln
420 425 430

Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe Trp Val Ile
435 440 445

Val His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg Gln Asn Arg
450 455 460

Thr Pro Thr Ile Val Ile Val Trp Ala Val Leu Leu Ala Ser Ile Phe
465 470 475 480

Ser Leu Leu Trp Val Arg Val Asp Pro Phe Thr Thr Arg Leu Ala Gly
485 490 495

Pro Asn Ile Gln Thr Cys Gly Ile Asn Cys
500 505

<210> 21
<211> 1029
<212> DNA
<213> Triticum aestivum

<400> 21
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gctcgtgccg tcctacatga gcggcggcgg cggcgggggc aagaggatcc acccgctccc 120
tttcgcagat cccaaccttc cagtgcaacc gagatccatg gacccgtcca aggatctggc 180
cgcctacgga tatggcagcg tggcctggaa ggagagaatg gagggctgga agcagaagca 240
ggagcgcctg cagcatgtca ggagcgaggg tggcggtgat tgggatggcg acgatgcaga 300
tctgccacta atggatgaag ctaggcagcc attgtccaga aaagtcccta tatcatcaag 360
ccgaattaat ccctacagga tgattatcgt tatccggttg gtggttttgg gtttcttctt 420
ccactaccga gtgatgcatc cggcgaaaga tgcatttgca ttgtggctca tatctgtaat 480
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cgagagagag acttacctgg accgtttgtc actaaggttt gacaaggaag gtcaaccctc 600
tcagcttgct ccaatcgact tctttgtcag tacggttgat cccacaaagg aacctccctt 660
ggtcacagcg aacactgtcc tttccatcct ttctgtggat tatccggttg agaaggtctc 720
ctgctatgtt tctgatgatg gtgctgcaat gcttacgttt gaagcattgt ctgaaacatc 780

tgaatttgca aagaaatggg ttcctttcag caaaaagttt aatatcgagc ctcgtgctcc 840
tgagtggtac ttccaacaga agatagacta cctgaaagac aaggttgctg cttcatttgt 900
tagggagagg agggcgatga agagagaata cgaggaattc aaggtaagga tcaatgcctt 960
ggttgcaaaa gcccaaaagg ttcctgagga aggatggaca atgcaagatg gaagcccctg 1020
gcctggaaa 1029

<210> 22
<211> 340
<212> PRT
<213> Triticum aestivum

<400> 22
Pro Leu Leu Thr Asn Gly Gln Met Val Asp Asp Ile Pro Pro Glu Gln
1 5 10 15

His Ala Leu Val Pro Ser Tyr Met Ser Gly Gly Gly Gly Gly Gly Lys
20 25 30

Arg Ile His Pro Leu Pro Phe Ala Asp Pro Asn Leu Pro Val Gln Pro
35 40 45

Arg Ser Met Asp Pro Ser Lys Asp Leu Ala Ala Tyr Gly Tyr Gly Ser
50 55 60

Val Ala Trp Lys Glu Arg Met Glu Gly Trp Lys Gln Lys Gln Glu Arg
65 70 75 80

Leu Gln His Val Arg Ser Glu Gly Gly Gly Asp Trp Asp Gly Asp Asp
85 90 95

Ala Asp Leu Pro Leu Met Asp Glu Ala Arg Gln Pro Leu Ser Arg Lys
100 105 110

Val Pro Ile Ser Ser Ser Arg Ile Asn Pro Tyr Arg Met Ile Ile Val
115 120 125

Ile Arg Leu Val Val Leu Gly Phe Phe Phe His Tyr Arg Val Met His
130 135 140

Pro Ala Lys Asp Ala Phe Ala Leu Trp Leu Ile Ser Val Ile Cys Glu
145 150 155 160

Ile Trp Phe Ala Met Ser Cys Ile Leu Asp Gln Phe Pro Lys Trp Phe
165 170 175

Pro Ile Glu Arg Glu Thr Tyr Leu Asp Arg Leu Ser Leu Arg Phe Asp
180 185 190

Lys Glu Gly Gln Pro Ser Gln Leu Ala Pro Ile Asp Phe Phe Val Ser
195 200 205

Thr Val Asp Pro Thr Lys Glu Pro Pro Leu Val Thr Ala Asn Thr Val
210 215 220

Leu Ser Ile Leu Ser Val Asp Tyr Pro Val Glu Lys Val Ser Cys Tyr
225 230 235 240

Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe Glu Ala Leu Ser Glu
245 250 255

Thr Ser Glu Phe Ala Lys Lys Trp Val Pro Phe Ser Lys Lys Phe Asn
260 265 270

Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Gln Gln Lys Ile Asp Tyr
275 280 285

Leu Lys Asp Lys Val Ala Ala Ser Phe Val Arg Glu Arg Arg Ala Met
290 295 300

Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Leu Val Ala
305 310 315 320

Lys Ala Gln Lys Val Pro Glu Glu Gly Trp Thr Met Gln Asp Gly Ser
325 330 335

Pro Trp Pro Gly
340

<210> 23
<211> 1081
<212> PRT
<213> Arabidopsis thaliana

<400> 23
Met Glu Ala Ser Ala Gly Leu Val Ala Gly Ser Tyr Arg Arg Asn Glu
1 5 10 15

Leu Val Arg Ile Arg His Glu Ser Asp Gly Gly Thr Lys Pro Leu Lys
20 25 30

Asn Met Asn Gly Gln Ile Cys Gln Ile Cys Gly Asp Asp Val Gly Leu
35 40 45

Ala Glu Thr Gly Asp Val Phe Val Ala Cys Asn Glu Cys Ala Phe Pro
50 55 60

Val Cys Arg Pro Cys Tyr Glu Tyr Glu Arg Lys Asp Gly Thr Gln Cys
65 70 75 80

Cys Pro Gln Cys Lys Thr Arg Phe Arg Arg His Arg Gly Ser Pro Arg
85 90 95

Val Glu Gly Asp Glu Asp Glu Asp Asp Val Asp Asp Ile Glu Asn Glu
100 105 110

Phe Asn Tyr Ala Gln Gly Ala Asn Lys Ala Arg His Gln Arg His Gly
115 120 125

Glu Glu Phe Ser Ser Ser Ser Arg His Glu Ser Gln Pro Ile Pro Leu
130 135 140

Leu Thr His Gly His Thr Val Ser Gly Glu Ile Arg Thr Pro Asp Thr
145 150 155 160

Gln Ser Val Arg Thr Thr Ser Gly Pro Leu Gly Pro Ser Asp Arg Asn
165 170 175

Ala Ile Ser Ser Pro Tyr Ile Asp Pro Arg Gln Pro Val Pro Val Arg
180 185 190

Ile Val Asp Pro Ser Lys Asp Leu Asn Ser Tyr Gly Leu Gly Asn Val
195 200 205

Asp Trp Lys Glu Arg Val Glu Gly Trp Lys Leu Lys Gln Glu Lys Asn
210 215 220

Met Leu Gln Met Thr Gly Lys Tyr His Glu Gly Lys Gly Gly Glu Ile
225 230 235 240

Glu Gly Thr Gly Ser Asn Gly Glu Glu Leu Gln Met Ala Asp Asp Thr
245 250 255

Arg Leu Pro Met Ser Arg Val Val Pro Ile Pro Ser Ser Arg Leu Thr
260 265 270

Pro Tyr Arg Val Val Ile Ile Leu Arg Leu Ile Ile Leu Cys Phe Phe
275 280 285

Leu Gln Tyr Arg Thr Thr His Pro Val Lys Asn Ala Tyr Pro Leu Trp
290 295 300

Leu Thr Ser Val Ile Cys Glu Ile Trp Phe Ala Phe Ser Trp Leu Leu
305 310 315 320

Asp Gln Phe Pro Lys Trp Tyr Pro Ile Asn Arg Glu Thr Tyr Leu Asp
325 330 335

Arg Leu Ala Ile Arg Tyr Asp Arg Asp Gly Glu Pro Ser Gln Leu Val
340 345 350

Pro Val Asp Val Phe Val Ser Thr Val Asp Pro Leu Lys Glu Pro Pro
355 360 365

Leu Val Thr Ala Asn Thr Val Leu Ser Ile Leu Ser Val Asp Tyr Pro
370 375 380

Val Asp Lys Val Ala Cys Tyr Val Ser Asp Asp Gly Ser Ala Met Leu
385 390 395 400

Thr Phe Glu Ser Leu Ser Glu Thr Ala Glu Phe Ala Lys Lys Trp Val
405 410 415

Pro Phe Cys Lys Lys Phe Asn Ile Glu Pro Arg Ala Pro Glu Phe Tyr
420 425 430

Phe Ala Gln Lys Ile Asp Tyr Leu Lys Asp Lys Ile Gln Pro Ser Phe
435 440 445

Val Lys Glu Arg Arg Ala Met Lys Arg Glu Tyr Glu Glu Phe Lys Val
450 455 460

Arg Ile Asn Ala Leu Val Ala Lys Ala Gln Lys Ile Pro Glu Glu Gly
465 470 475 480

Trp Thr Met Gln Asp Gly Thr Pro Trp Pro Gly Asn Asn Thr Arg Asp
485 490 495

His Pro Gly Met Ile Gln Val Phe Leu Gly His Ser Gly Gly Leu Asp
500 505 510

Thr Asp Gly Asn Glu Leu Pro Arg Leu Ile Tyr Val Ser Arg Glu Lys
515 520 525

Arg Pro Gly Phe Gln His His Lys Lys Ala Gly Ala Met Asn Ala Leu
530 535 540

Ile Arg Val Ser Ala Val Leu Thr Asn Gly Ala Tyr Leu Leu Asn Val
545 550 555 560

Asp Cys Asp His Tyr Phe Asn Asn Ser Lys Ala Ile Lys Glu Ala Met
565 570 575

Cys Phe Met Met Asp Pro Ala Ile Gly Lys Lys Cys Cys Tyr Val Gln
580 585 590

Phe Pro Gln Arg Phe Asp Gly Ile Asp Leu His Asp Arg Tyr Ala Asn
595 600 605

Arg Asn Ile Val Phe Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Ile
610 615 620

Gln Gly Pro Val Tyr Val Gly Thr Gly Cys Cys Phe Asn Arg Gln Ala
625 630 635 640

Leu Tyr Gly Tyr Asp Pro Val Leu Thr Glu Glu Asp Leu Glu Pro Asn
645 650 655

Ile Ile Val Lys Ser Cys Cys Gly Ser Arg Lys Lys Gly Lys Ser Ser
660 665 670

Lys Lys Tyr Asn Tyr Glu Lys Arg Arg Gly Ile Asn Arg Ser Asp Ser
675 680 685

Asn Ala Pro Leu Phe Asn Met Glu Asp Ile Asp Glu Gly Phe Glu Gly
690 695 700

Tyr Asp Asp Glu Arg Ser Ile Leu Met Ser Gln Arg Ser Val Glu Lys
705 710 715 720

Arg Phe Gly Gln Ser Pro Val Phe Ile Ala Ala Thr Phe Met Glu Gln
725 730 735

Gly Gly Ile Pro Pro Thr Thr Asn Pro Ala Thr Leu Leu Lys Glu Ala
740 745 750

Ile His Val Ile Ser Cys Gly Tyr Glu Asp Lys Thr Glu Trp Gly Lys
755 760 765

Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu Thr Gly
770 775 780

Phe Lys Met His Ala Arg Gly Trp Ile Ser Ile Tyr Cys Asn Pro Pro
785 790 795 800

Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp Arg Leu
805 810 815

Asn Gln Val Leu Arg Trp Ala Leu Gly Ser Ile Glu Ile Leu Leu Ser
820 825 830

Arg His Cys Pro Ile Trp Tyr Gly Tyr His Gly Arg Leu Arg Leu Leu
835 840 845

Glu Arg Ile Ala Tyr Ile Asn Thr Ile Val Tyr Pro Ile Thr Ser Ile
850 855 860

Pro Leu Ile Ala Tyr Cys Ile Leu Pro Ala Phe Cys Leu Ile Thr Asp
865 870 875 880

Arg Phe Ile Ile Pro Glu Ile Ser Asn Tyr Ala Ser Ile Trp Phe Ile
885 890 895

Leu Leu Phe Ile Ser Ile Ala Val Thr Gly Ile Leu Glu Leu Arg Trp
900 905 910

Ser Gly Val Ser Ile Glu Asp Trp Trp Arg Asn Glu Gln Phe Trp Val
915 920 925

Ile Gly Gly Thr Ser Ala His Leu Phe Ala Val Phe Gln Gly Leu Leu
930 935 940

Lys Val Leu Ala Gly Ile Asp Thr Asn Phe Thr Val Thr Ser Lys Ala
945 950 955 960

Thr Asp Glu Asp Gly Asp Phe Ala Glu Leu Tyr Ile Phe Lys Trp Thr
965 970 975

Ala Leu Leu Ile Pro Pro Thr Thr Val Leu Leu Val Asn Leu Ile Gly
980 985 990

Ile Val Ala Gly Val Ser Tyr Ala Val Asn Ser Gly Tyr Gln Ser Trp
995 1000 1005

Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Leu Trp Val Ile Ala His
1010 1015 1020

Leu Tyr Pro Phe Leu Lys Gly Leu Leu Gly Arg Gln Asn Arg Thr Pro
1025 1030 1035 1040

Thr Ile Val Ile Val Trp Ser Val Leu Leu Ala Ser Ile Phe Ser Leu
1045 1050 1055

Leu Trp Val Arg Ile Asn Pro Phe Val Asp Ala Asn Pro Asn Ala Asn
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Asn Phe Asn Gly Lys Gly Gly Val Phe
1075 1080

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Phe Val Leu Ile Asn Ala Asp Glu Ser Ala Arg Ile Arg Ser Val Gln
20 25 30

Glu Leu Ser Gly Gln Thr Cys Gln Ile Cys Gly Asp Glu Ile Glu Leu
35 40 45

Thr Val Ser Ser Glu Leu Phe Val Ala Cys Asn Glu Cys Ala Phe Pro
50 55 60

Val Cys Arg Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Asn Gln Ala
65 70 75 80

Cys Pro Gln Cys Lys Thr Arg Tyr Lys Arg Ile Lys Gly Ser Pro Arg
85 90 95

Val Asp Gly Asp Asp Glu Glu Glu Glu Asp Ile Asp Asp Leu Glu Tyr
100 105 110

Glu Phe Asp His Gly Met Asp Pro Glu His Ala Ala Glu Ala Ala Leu
115 120 125

Ser Ser Arg Leu Asn Thr Gly Arg Gly Gly Leu Asp Ser Ala Pro Pro
130 135 140

Gly Ser Gln Ile Pro Leu Leu Thr Tyr Cys Asp Glu Asp Ala Asp Met
145 150 155 160

Tyr Ser Asp Arg His Ala Leu Ile Val Pro Pro Ser Thr Gly Tyr Gly
165 170 175

Asn Arg Val Tyr Pro Ala Pro Phe Thr Asp Ser Ser Ala Pro Pro Gln
180 185 190

Ala Arg Ser Met Val Pro Gln Lys Asp Ile Ala Glu Tyr Gly Tyr Gly
195 200 205

Ser Val Ala Trp Lys Asp Arg Met Glu Val Trp Lys Arg Arg Gln Gly
210 215 220

Glu Lys Leu Gln Val Ile Lys His Glu Gly Gly Asn Asn Gly Arg Gly
225 230 235 240

Ser Asn Asp Asp Asp Glu Leu Asp Asp Pro Asp Met Pro Met Met Asp
245 250 255

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Glu Gly Arg Gln Pro Leu Ser Arg Lys Leu Pro Ile Arg Ser Ser Arg
            260                 265                 270

Ile Asn Pro Tyr Arg Met Leu Ile Leu Cys Arg Leu Ala Ile Leu Gly
        275                 280                 285

Leu Phe Phe His Tyr Arg Ile Leu His Pro Val Asn Asp Ala Tyr Gly
    290                 295                 300

Leu Trp Leu Thr Ser Val Ile Cys Glu Ile Trp Phe Ala Val Ser Trp
305                 310                 315                 320

Ile Leu Asp Gln Phe Pro Lys Trp Tyr Pro Ile Glu Arg Glu Thr Tyr
                325                 330                 335

Leu Asp Arg Leu Ser Leu Arg Tyr Glu Lys Glu Gly Lys Pro Ser Gly
            340                 345                 350

Leu Ala Pro Val Asp Val Phe Val Ser Thr Val Asp Pro Leu Lys Glu
        355                 360                 365

Pro Pro Leu Ile Thr Ala Asn Thr Val Leu Ser Ile Leu Ala Val Asp
    370                 375                 380

Tyr Pro Val Asp Lys Val Ala Cys Tyr Val Ser Asp Asp Gly Ala Ala
385                 390                 395                 400

Met Leu Thr Phe Glu Ala Leu Ser Asp Thr Ala Glu Phe Ala Arg Lys
                405                 410                 415

Trp Val Pro Phe Cys Lys Lys Phe Asn Ile Glu Pro Arg Ala Pro Glu
            420                 425                 430

Trp Tyr Phe Ser Gln Lys Met Asp Tyr Leu Lys Asn Lys Val His Pro
        435                 440                 445

Ala Phe Val Arg Glu Arg Arg Ala Met Lys Arg Asp Tyr Glu Glu Phe
    450                 455                 460

Lys Val Lys Ile Asn Ala Leu Val Ala Thr Ala Gln Lys Val Pro Glu
465                 470                 475                 480

Glu Gly Trp Thr Met Gln Asp Gly Thr Pro Trp Pro Gly Asn Asn Val
                485                 490                 495

Arg Asp His Pro Gly Met Ile Gln Val Phe Leu Gly His Ser Gly Val
            500                 505                 510

Arg Asp Thr Asp Gly Asn Glu Leu Pro Arg Leu Val Tyr Val Ser Arg
        515                 520                 525

Glu Lys Arg Pro Gly Phe Asp His His Lys Lys Ala Gly Ala Met Asn
    530                 535                 540

Ser Leu Ile Arg Val Ser Ala Val Leu Ser Asn Ala Pro Tyr Leu Leu
545                 550                 555                 560
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Asn Val Asp Cys Asp His Tyr Ile Asn Asn Ser Lys Ala Ile Arg Glu
565 570 575

Ser Met Cys Phe Met Met Asp Pro Gln Ser Gly Lys Lys Val Cys Tyr
580 585 590

Val Gln Phe Pro Gln Arg Phe Asp Gly Ile Asp Arg His Asp Arg Tyr
595 600 605

Ser Asn Arg Asn Val Val Phe Phe Asp Ile Asn Met Lys Gly Leu Asp
610 615 620

Gly Ile Gln Gly Pro Ile Tyr Val Gly Thr Gly Cys Val Phe Arg Arg
625 630 635 640

Gln Ala Leu Tyr Gly Phe Asp Ala Pro Lys Lys Lys Lys Pro Pro Gly
645 650 655

Lys Thr Cys Asn Cys Trp Pro Lys Trp Cys Cys Leu Cys Cys Gly Leu
660 665 670

Arg Lys Lys Ser Lys Thr Lys Ala Lys Asp Lys Lys Thr Asn Thr Lys
675 680 685

Glu Thr Ser Lys Gln Ile His Ala Leu Glu Asn Val Asp Glu Gly Val
690 695 700

Ile Val Pro Val Ser Asn Val Glu Lys Arg Ser Glu Ala Thr Gln Leu
705 710 715 720

Lys Leu Glu Lys Lys Phe Gly Gln Ser Pro Val Phe Val Ala Ser Ala
725 730 735

Val Leu Gln Asn Gly Gly Val Pro Arg Asn Ala Ser Pro Ala Cys Leu
740 745 750

Leu Arg Glu Ala Ile Gln Val Ile Ser Cys Gly Tyr Glu Asp Lys Thr
755 760 765

Glu Trp Gly Lys Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp
770 775 780

Ile Leu Thr Gly Phe Lys Met His Cys His Gly Trp Arg Ser Val Tyr
785 790 795 800

Cys Met Pro Lys Arg Ala Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu
805 810 815

Ser Asp Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly Ser Val Glu
820 825 830

Ile Phe Leu Ser Arg His Cys Pro Ile Trp Tyr Gly Tyr Gly Gly Gly
835 840 845

Leu Lys Trp Leu Glu Arg Phe Ser Tyr Ile Asn Ser Val Val Tyr Pro
850 855 860

Trp Thr Ser Leu Pro Leu Ile Val Tyr Cys Ser Leu Pro Ala Val Cys
865 870 875 880

Leu Leu Thr Gly Lys Phe Ile Val Pro Glu Ile Ser Asn Tyr Ala Gly
885 890 895

Ile Leu Phe Met Leu Met Phe Ile Ser Ile Ala Val Thr Gly Ile Leu
900 905 910

Glu Met Gln Trp Gly Gly Val Gly Ile Asp Asp Trp Trp Arg Asn Glu
915 920 925

Gln Phe Trp Val Ile Gly Gly Ala Ser Ser His Leu Phe Ala Leu Phe
930 935 940

Gln Gly Leu Leu Lys Val Leu Ala Gly Val Asn Thr Asn Phe Thr Val
945 950 955 960

Thr Ser Lys Ala Ala Asp Asp Gly Ala Phe Ser Glu Leu Tyr Ile Phe
965 970 975

Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Leu Ile Ile Asn
980 985 990

Ile Ile Gly Val Ile Val Gly Val Ser Asp Ala Ile Ser Asn Gly Tyr
995 1000 1005

Asp Ser Trp Gly Pro Leu Phe Gly Arg Leu Phe Phe Ala Leu Trp Val
1010 1015 1020

Ile Val His Leu Tyr Pro Phe Leu Lys Gly Met Leu Gly Lys Gln Asp
1025 1030 1035 1040

Lys Met Pro Thr Ile Ile Val Val Trp Ser Ile Leu Leu Ala Ser Ile
1045 1050 1055

Leu Thr Leu Leu Trp Val Arg Val Asn Pro Phe Val Ala Lys Gly Gly
1060 1065 1070

Pro Val Leu Glu Ile Cys Gly Leu Asn Cys Gly Asn
1075 1080

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Pro Glu Phe Tyr Phe Asn Glu Lys Ile Asp Tyr Leu Lys Asp Lys Val
20 25 30

His Pro Ser Phe Val Lys Glu Arg Arg Ala Met Lys Arg Glu Tyr Glu
35 40 45

Glu Phe Lys Val Arg Ile Asn Ala Leu Val Ala Lys Ala Gln Lys Lys
50 55 60

Pro Glu Glu Gly Trp Val Met Gln Asp Gly Thr Pro Trp Pro Gly Asn
65 70 75 80

Asn Thr Arg Asp His Pro Gly Met Ile Gln Val Tyr Leu Gly Ser Ala
85 90 95

Gly Ala Leu Asp Val Asp Gly Lys Glu Leu Pro Arg Leu Val Tyr Val
100 105 110

Ser Arg Glu Lys Arg Pro Gly Tyr Gln His His Lys Lys Ala Gly Ala
115 120 125

Glu Asn Ala Leu Val Arg Val Ser Ala Val Leu Thr Asn Ala Pro Phe
130 135 140

Ile Leu Asn Leu Asp Cys Asp His Tyr Ile Asn Asn Ser Lys Ala Met
145 150 155 160

Arg Glu Ala Met Cys Phe Leu Met Asp Pro Gln Phe Gly Lys Lys Leu
165 170 175

Cys Tyr Val Gln Phe Pro Gln Arg Phe Asp Gly Ile Asp Arg His Asp
180 185 190

Arg Tyr Ala Asn Arg Asn Val Val Phe Phe Asp Ile Asn Met Leu Gly
195 200 205

Leu Asp Gly Leu Gln Gly Pro Val Tyr Val Gly Thr Gly Cys Val Phe
210 215 220

Asn Arg Gln Ala Leu Tyr Gly Tyr Asp Pro Pro Val Ser Glu Lys Arg
225 230 235 240

Pro Lys Met Thr Cys Asp Cys Trp Pro Ser Trp Cys Cys Cys Cys Cys
245 250 255

Gly Gly Ser Arg Lys Lys Ser Lys Lys Lys Gly Glu Lys Lys Gly Leu
260 265 270

Leu Gly Gly Leu Leu Tyr Gly Lys Lys Lys Lys Met Met Gly Lys Asn
275 280 285

Tyr Val Lys Lys Gly Ser Ala Pro Val Phe Asp Leu Glu Glu Ile Glu
290 295 300

Glu Gly Leu Glu Gly Tyr Glu Glu Leu Glu Lys Ser Thr Leu Met Ser
305 310 315 320

Gln Lys Asn Phe Glu Lys Arg Phe Gly Gln Ser Pro Val Phe Ile Ala
325 330 335

Ser Thr Leu Met Glu Asn Gly Gly Leu Pro Glu Gly Thr Asn Ser Thr
340 345 350

Ser Leu Ile Lys Glu Ala Ile His Val Ile Ser Cys Gly Tyr Glu Glu
355 360 365

Lys Thr Glu Trp Gly Lys Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr
370 375 380

Glu Asp Ile Leu Thr Gly Phe Lys Met His Cys Arg Gly Trp Lys Ser
385 390 395 400

Val Tyr Cys Val Pro Lys Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile
405 410 415

Asn Leu Ser Asp Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly Ser
420 425 430

Val Glu Ile Phe Leu Ser Arg His Cys Pro Leu Trp Tyr Gly Tyr Gly
435 440 445

Gly Lys Leu Lys Trp Leu Glu Arg Leu Ala Tyr Ile Asn Thr Ile Val
450 455 460

Tyr Pro Phe Thr Ser Ile Pro Leu Leu Ala Tyr Cys Thr Ile Pro Ala
465 470 475 480

Val Cys Leu Leu Thr Gly Lys Phe Ile Ile Pro Thr Leu Ser Asn Leu
485 490 495

Thr Ser Val Trp Phe Leu Ala Leu Phe Leu Ser Ile Ile Ala Thr Gly
500 505 510

Val Leu Glu Leu Arg Trp Ser Gly Val Ser Ile Gln Asp Trp Trp Arg
515 520 525

Asn Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ala His Leu Phe Ala
530 535 540

Val Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Val Asp Thr Asn Phe
545 550 555 560

Thr Val Thr Ala Lys Ala Ala Asp Asp Thr Glu Phe Gly Glu Leu Tyr
565 570 575

Leu Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Ile Ile
580 585 590

Leu Asn Met Val Gly Val Val Ala Gly Val Ser Asp Ala Ile Asn Asn
595 600 605

Gly Tyr Gly Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe
610 615 620

Trp Val Ile Leu His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg
625 630 635 640

Gln Asn Arg Thr Pro Thr Ile Val Val Leu Trp Ser Ile Leu Leu Ala
645 650 655

Ser Ile Phe Ser Leu Val Trp Val Arg Ile Asp Pro Phe Leu Pro Lys
660 665 670

Gln Thr Gly Pro Val Leu Lys Gln Cys Gly Val Glu Cys
675 680 685

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Gly Ser Gly Gln Thr Val Lys Phe Ala Arg Arg Thr Ser Ser Gly Arg
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Tyr Val Ser Leu Ser Arg Asp Asn Ile Glu Leu Ser Gly Glu Leu Ser
35 40 45

Gly Asp Tyr Ser Asn Tyr Thr Val His Ile Pro Pro Thr Pro Asp Asn
50 55 60

Gln Pro Met Ala Thr Lys Ala Glu Glu Gln Tyr Val Ser Asn Ser Leu
65 70 75 80

Phe Thr Gly Gly Phe Asn Ser Val Thr Arg Ala His Leu Met Asp Lys
85 90 95

Val Ile Asp Ser Asp Val Thr His Pro Gln Met Ala Gly Ala Lys Gly
100 105 110

Ser Ser Cys Ala Met Pro Ala Cys Asp Gly Asn Val Met Lys Asp Glu
115 120 125

Arg Gly Lys Asp Val Met Pro Cys Glu Cys Arg Phe Lys Ile Cys Arg
130 135 140

Asp Cys Phe Met Asp Ala Gln Lys Glu Thr Gly Leu Cys Pro Gly Cys
145 150 155 160

Lys Glu Gln Tyr Lys Ile Gly Asp Leu Asp Asp Asp Thr Pro Asp Tyr
165 170 175

Ser Ser Gly Ala Leu Pro Leu Pro Ala Pro Gly Lys Asp Gln Arg Gly
180 185 190

Asn Asn Asn Asn Met Ser Met Met Lys Arg Asn Gln Asn Gly Glu Phe
195 200 205

Asp His Asn Arg Trp Leu Phe Glu Thr Gln Gly Thr Tyr Gly Tyr Gly
210 215 220

Asn Ala Tyr Trp Pro Gln Asp Glu Met Tyr Gly Asp Asp Met Asp Glu
225 230 235 240

Gly Met Arg Gly Gly Met Val Glu Thr Ala Asp Lys Pro Trp Arg Pro
245 250 255

Leu Ser Arg Arg Ile Pro Ile Pro Ala Ala Ile Ile Ser Pro Tyr Arg
260 265 270

Leu Leu Ile Val Ile Arg Phe Val Val Leu Cys Phe Phe Leu Thr Trp
275 280 285

Arg Ile Arg Asn Pro Asn Glu Asp Ala Ile Trp Leu Trp Leu Met Ser
290 295 300

Ile Ile Cys Glu Leu Trp Phe Gly Phe Ser Trp Ile Leu Asp Gln Ile
305 310 315 320

Pro Lys Leu Cys Pro Ile Asn Arg Ser Thr Asp Leu Glu Val Leu Arg
325 330 335

Asp Lys Phe Asp Met Pro Ser Pro Ser Asn Pro Thr Gly Arg Ser Asp
340 345 350

Leu Pro Gly Ile Asp Leu Phe Val Ser Thr Ala Asp Pro Glu Lys Glu
355 360 365

Pro Pro Leu Val Thr Ala Asn Thr Ile Leu Ser Ile Leu Ala Val Asp
370 375 380

Tyr Pro Val Glu Lys Val Ser Cys Tyr Leu Ser Asp Asp Gly Gly Ala
385 390 395 400

Leu Leu Ser Phe Glu Ala Met Ala Glu Ala Ala Ser Phe Ala Asp Leu
405 410 415

Trp Val Pro Phe Cys Arg Lys His Asn Ile Glu Pro Arg Asn Pro Asp
420 425 430

Ser Tyr Phe Ser Leu Lys Ile Asp Pro Thr Lys Asn Lys Ser Arg Ile
435 440 445

Asp Phe Val Lys Asp Arg Arg Lys Ile Lys Arg Glu Tyr Asp Glu Phe
450 455 460

Lys Val Arg Ile Asn Gly Leu Pro Asp Ser Ile Arg Arg Arg Ser Asp
465 470 475 480

Ala Phe Asn Ala Arg Glu Glu Met Lys Ala Leu Lys Gln Met Arg Glu
485 490 495

Ser Gly Gly Asp Pro Thr Glu Pro Val Lys Val Pro Lys Ala Thr Trp
500 505 510

Met Ala Asp Gly Thr His Trp Pro Gly Thr Trp Ala Ala Ser Thr Arg
515 520 525

Glu His Ser Lys Gly Asp His Ala Gly Ile Leu Gln Val Met Leu Lys
530 535 540

Pro Pro Ser Ser Asp Pro Leu Ile Gly Asn Ser Asp Asp Lys Val Ile
545 550 555 560

Asp Phe Ser Asp Thr Asp Thr Arg Leu Pro Met Phe Val Tyr Val Ser
565 570 575

Arg Glu Lys Arg Pro Gly Tyr Asp His Asn Lys Lys Ala Gly Ala Met
580 585 590

Asn Ala Leu Val Arg Ala Ser Ala Ile Leu Ser Asn Gly Pro Phe Ile
595 600 605

Leu Asn Leu Asp Cys Asp His Tyr Ile Tyr Asn Cys Lys Ala Val Arg
610 615 620

Glu Gly Met Cys Phe Met Met Asp Arg Gly Gly Glu Asp Ile Cys Tyr
625 630 635 640

Ile Gln Phe Pro Gln Arg Phe Glu Gly Ile Asp Pro Ser Asp Arg Tyr
645 650 655

Ala Asn Asn Asn Thr Val Phe Phe Asp Gly Asn Met Arg Ala Leu Asp
660 665 670

Gly Val Gln Gly Pro Val Tyr Val Gly Thr Gly Thr Met Phe Arg Arg
675 680 685

Phe Ala Leu Tyr Gly Phe Asp Pro Pro Asn Pro Asp Lys Leu Leu Glu
690 695 700

Lys Lys Glu Ser Glu Thr Glu Ala Leu Thr Thr Ser Asp Phe Asp Pro
705 710 715 720

Asp Leu Asp Val Thr Gln Leu Pro Lys Arg Phe Gly Asn Ser Thr Leu
725 730 735

Leu Ala Glu Ser Ile Pro Ile Ala Glu Phe Gln Gly Arg Pro Leu Ala
740 745 750

Asp His Pro Ala Val Lys Tyr Gly Arg Pro Pro Gly Ala Leu Arg Val
755 760 765

Pro Arg Asp Pro Leu Asp Ala Thr Thr Val Ala Glu Ser Val Ser Val
770 775 780

Ile Ser Cys Trp Tyr Glu Asp Lys Thr Glu Trp Gly Asp Arg Val Gly
785 790 795 800

Trp Ile Tyr Gly Ser Val Thr Glu Asp Val Val Thr Gly Tyr Arg Met
805 810 815

His Asn Arg Gly Trp Arg Ser Val Tyr Cys Ile Thr Lys Arg Asp Ser
820 825 830

Phe Arg Gly Ser Ala Pro Ile Asn Leu Thr Asp Arg Leu His Gln Val
835 840 845

Leu Arg Trp Ala Thr Gly Ser Val Glu Ile Phe Phe Ser Arg Asn Asn
850 855 860

Ala Ile Leu Ala Ser Lys Arg Leu Lys Phe Leu Gln Arg Leu Ala Tyr
865 870 875 880

Leu Asn Val Gly Ile Tyr Pro Phe Thr Ser Leu Phe Leu Ile Leu Tyr
885 890 895

Cys Phe Leu Pro Ala Phe Ser Leu Phe Ser Gly Gln Phe Ile Val Arg
900 905 910

Thr Leu Ser Ile Ser Phe Leu Val Tyr Leu Leu Met Ile Thr Ile Cys
915 920 925

Leu Ile Gly Leu Ala Val Leu Glu Val Lys Trp Ser Gly Ile Gly Leu
930 935 940

Glu Glu Trp Trp Arg Asn Glu Gln Trp Trp Leu Ile Ser Gly Thr Ser
945 950 955 960

Ser His Leu Tyr Ala Val Val Gln Gly Val Leu Lys Val Ile Ala Gly
965 970 975

Ile Glu Ile Ser Phe Thr Leu Thr Thr Lys Ser Gly Gly Asp Asp Asn
980 985 990

Glu Asp Ile Tyr Ala Asp Leu Tyr Ile Val Lys Trp Ser Ser Leu Met
995 1000 1005

Ile Pro Pro Ile Val Ile Ala Met Val Asn Ile Ile Ala Ile Val Val
1010 1015 1020

Ala Phe Ile Arg Thr Ile Tyr Gln Ala Val Pro Gln Trp Ser Lys Leu
1025 1030 1035 1040

Ile Gly Gly Ala Phe Phe Ser Phe Trp Val Leu Ala His Leu Tyr Pro
1045 1050 1055

Phe Ala Lys Gly Leu Met Gly Arg Arg Gly Lys Thr Pro Thr Ile Val
1060 1065 1070

Phe Val Trp Ala Gly Leu Ile Ala Ile Thr Ile Ser Leu Leu Trp Thr
1075 1080 1085

Ala Ile Asn Pro Asn Thr Gly Pro Ala Ala Ala Ala Glu Gly Val Gly
1090 1095 1100

Gly Gly Gly Phe Gln Phe Pro
1105 1110

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<400> 27

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Leu Val Val Ile His Asn His Glu Glu Pro Lys Pro Leu Lys Asn Leu
            20                  25                  30

Asp Gly Gln Phe Cys Glu Ile Cys Gly Asp Gln Ile Gly Leu Thr Val
        35                  40                  45

Glu Gly Asp Leu Phe Val Ala Cys Asn Glu Cys Gly Phe Pro Ala Cys
    50                  55                  60

Arg Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Thr Gln Asn Cys Pro
65                  70                  75                  80

Gln Cys Lys Thr Arg Tyr Lys Arg Leu Arg Gly Ser Pro Arg Val Glu
                85                  90                  95

Gly Asp Glu Asp Glu Glu Asp Ile Asp Asp Ile Glu Tyr Glu Phe Asn
            100                 105                 110

Ile Glu His Glu Gln Asp Lys His Lys His Ser Ala Glu Ala Met Leu
        115                 120                 125

Tyr Gly Lys Met Ser Tyr Gly Arg Gly Pro Glu Asp Asp Glu Asn Gly
    130                 135                 140

Arg Phe Pro Pro Val Ile Ala Gly Gly His Ser Gly Glu Phe Pro Val
145                 150                 155                 160

Gly Gly Gly Tyr Gly Asn Gly Glu His Gly Leu His Lys Arg Val His
                165                 170                 175

Pro Tyr Pro Ser Ser Glu Ala Gly Ser Glu Gly Gly Trp Arg Glu Arg
            180                 185                 190

Met Asp Asp Trp Lys Leu Gln His Gly Asn Leu Gly Pro Glu Pro Asp
        195                 200                 205

Asp Asp Pro Glu Met Gly Leu Ile Asp Glu Ala Arg Gln Pro Leu Ser
    210                 215                 220

Arg Lys Val Pro Ile Ala Ser Ser Lys Ile Asn Pro Tyr Arg Met Val
225                 230                 235                 240

Ile Val Ala Arg Leu Val Ile Leu Ala Val Phe Leu Arg Tyr Arg Leu
                245                 250                 255

Leu Asn Pro Val His Asp Ala Leu Gly Leu Trp Leu Thr Ser Val Ile
            260                 265                 270

Cys Glu Ile Trp Phe Ala Val Ser Trp Ile Leu Asp Gln Phe Pro Lys
        275                 280                 285

Trp Phe Pro Ile Glu Arg Glu Thr Tyr Leu Asp Arg Leu Ser Leu Arg
    290                 295                 300
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Tyr Glu Arg Glu Gly Glu Pro Asn Met Leu Ala Pro Val Asp Val Phe
305                 310                 315                 320

Val Ser Thr Val Asp Pro Leu Lys Glu Pro Pro Leu Val Thr Ser Asn
                325                 330                 335

Thr Val Leu Ser Ile Leu Ala Met Asp Tyr Pro Val Glu Lys Ile Ser
            340                 345                 350

Cys Tyr Val Ser Asp Asp Gly Ala Ser Met Leu Thr Phe Glu Ser Leu
        355                 360                 365

Ser Glu Thr Ala Glu Phe Ala Arg Lys Trp Val Pro Phe Cys Lys Lys
    370                 375                 380

Phe Ser Ile Glu Pro Arg Ala Pro Glu Met Tyr Phe Thr Leu Lys Val
385                 390                 395                 400

Asp Tyr Leu Gln Asp Lys Val His Pro Thr Phe Val Lys Glu Arg Arg
                405                 410                 415

Ala Met Lys Arg Glu Tyr Glu Glu Phe Lys Val Arg Ile Asn Ala Gln
            420                 425                 430

Val Ala Lys Ala Ser Lys Val Pro Leu Glu Gly Trp Ile Met Gln Asp
        435                 440                 445

Gly Thr Pro Trp Pro Gly Asn Asn Thr Lys Asp His Pro Gly Met Ile
    450                 455                 460

Gln Val Phe Leu Gly His Ser Gly Gly Phe Asp Val Glu Gly His Glu
465                 470                 475                 480

Leu Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro Gly Phe Gln
                485                 490                 495

His His Lys Lys Ala Gly Ala Met Asn Ala Leu Val Arg Val Ala Gly
            500                 505                 510

Val Leu Thr Asn Ala Pro Phe Met Leu Asn Leu Asp Cys Asp His Tyr
        515                 520                 525

Val Asn Asn Ser Lys Ala Val Arg Glu Ala Met Cys Phe Leu Met Asp
    530                 535                 540

Pro Gln Ile Gly Lys Lys Val Cys Tyr Val Gln Phe Pro Gln Arg Phe
545                 550                 555                 560

Asp Gly Ile Asp Thr Asn Asp Arg Tyr Ala Asn Arg Asn Thr Val Phe
                565                 570                 575

Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Ile Gln Gly Pro Val Tyr
            580                 585                 590

Val Gly Thr Gly Cys Val Phe Lys Arg Gln Ala Leu Tyr Gly Tyr Glu
        595                 600                 605
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Pro Pro Lys Gly Pro Lys Arg Pro Lys Met Ile Ser Cys Gly Cys Cys
610 615 620

Pro Cys Phe Gly Arg Arg Arg Lys Asn Lys Lys Phe Ser Lys Asn Asp
625 630 635 640

Met Asn Gly Asp Val Ala Ala Leu Gly Gly Ala Glu Gly Asp Lys Glu
645 650 655

His Leu Met Phe Glu Met Asn Phe Glu Lys Thr Phe Gly Gln Ser Ser
660 665 670

Ile Phe Val Thr Ser Thr Leu Met Glu Glu Gly Gly Val Pro Pro Ser
675 680 685

Ser Ser Pro Ala Val Leu Leu Lys Glu Ala Ile His Val Ile Ser Cys
690 695 700

Gly Tyr Glu Asp Lys Thr Glu Trp Gly Thr Glu Leu Gly Trp Ile Tyr
705 710 715 720

Gly Ser Ile Thr Glu Asp Ile Leu Thr Gly Phe Lys Met His Cys Arg
725 730 735

Gly Trp Arg Ser Ile Tyr Cys Met Pro Lys Arg Pro Ala Phe Lys Gly
740 745 750

Ser Ala Pro Ile Asn Leu Ser Asp Arg Leu Asn Gln Val Leu Arg Trp
755 760 765

Ala Leu Gly Ser Val Glu Ile Phe Phe Ser Arg His Ser Pro Leu Trp
770 775 780

Tyr Gly Tyr Lys Gly Gly Lys Leu Lys Trp Leu Glu Arg Phe Ala Tyr
785 790 795 800

Ala Asn Thr Thr Ile Tyr Pro Phe Thr Ser Ile Pro Leu Leu Ala Tyr
805 810 815

Cys Ile Leu Pro Ala Ile Cys Leu Leu Thr Asp Lys Phe Ile Met Pro
820 825 830

Pro Ile Ser Thr Phe Ala Ser Leu Phe Phe Ile Ser Leu Phe Met Ser
835 840 845

Ile Ile Val Thr Gly Ile Leu Glu Leu Arg Trp Ser Gly Val Ser Ile
850 855 860

Glu Glu Trp Trp Arg Asn Glu Gln Phe Trp Val Ile Gly Gly Ile Ser
865 870 875 880

Ala His Leu Phe Ala Val Val Gln Gly Leu Leu Lys Ile Leu Ala Gly
885 890 895

Ile Asp Thr Asn Phe Thr Val Thr Ser Lys Ala Thr Asp Asp Asp Asp
900 905 910

Phe Gly Glu Leu Tyr Ala Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro
915 920 925

Thr Thr Val Leu Ile Ile Asn Ile Val Gly Val Val Ala Gly Ile Ser
930 935 940

Asp Ala Ile Asn Asn Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys
945 950 955 960

Leu Phe Phe Ser Phe Trp Val Ile Val His Leu Tyr Pro Phe Leu Lys
965 970 975

Gly Leu Met Gly Arg Gln Asn Arg Thr Pro Thr Ile Val Val Ile Trp
980 985 990

Ser Val Leu Leu Ala Ser Ile Phe Ser Leu Leu Trp Val Arg Ile Asp
995 1000 1005

Pro Phe Val Leu Lys Thr Lys Gly Pro Asp Thr Ser Lys Cys Gly Ile
1010 1015 1020

Asn Cys
1025

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<400> 28
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Ala Met Leu Thr Phe Glu Ala Leu Ser Glu Thr Ser Glu Phe Ala Arg
20 25 30

Lys Trp Val Pro Phe Cys Lys Lys Tyr Asn Ile Glu Pro Arg Ala Pro
35 40 45

Glu Trp Tyr Phe Ala Gln Lys Ile Asp Tyr Leu Lys Asp Lys Val Gln
50 55 60

Thr Ser Phe Val Lys Glu Arg Arg Ala Met Lys Arg Glu Tyr Glu Glu
65 70 75 80

Phe Lys Val Arg Val Asn Gly Leu Val Ala Lys Ala Gln Lys Val Pro
85 90 95

Glu Glu Gly Trp Ile Met Gln Asp Gly Thr Pro Trp Pro Gly Asn Asn
100 105 110

Thr Arg Asp His Pro Gly Met Ile Gln Val Phe Leu Gly Gln Ser Gly
115 120 125

Gly Leu Asp Ala Glu Gly Asn Glu Leu Pro Arg Leu Val Tyr Val Ser
130 135 140

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Arg Glu Lys Arg Pro Gly Phe Gln His His Lys Lys Ala Gly Ala Met
145                 150                 155                 160

Asn Ala Leu Val Arg Val Ser Ala Val Leu Thr Asn Gly Ala Phe Leu
                165                 170                 175

Leu Asn Leu Asp Cys Asp His Tyr Ile Asn Asn Ser Lys Ala Leu Arg
            180                 185                 190

Glu Ala Met Cys Phe Leu Met Asp Pro Asn Leu Gly Lys Gln Val Cys
        195                 200                 205

Tyr Val Gln Phe Pro Gln Arg Phe Asp Gly Ile Asp Arg Asn Asp Arg
    210                 215                 220

Tyr Ala Asn Arg Asn Thr Val Phe Phe Asp Ile Asn Leu Arg Gly Leu
225                 230                 235                 240

Asp Gly Ile Gln Gly Pro Val Tyr Val Gly Thr Gly Cys Val Phe Asn
                245                 250                 255

Arg Thr Ala Leu Tyr Gly Tyr Glu Pro Pro Leu Lys Pro Lys His Arg
            260                 265                 270

Lys Thr Gly Ile Leu Ser Ser Leu Cys Gly Gly Ser Arg Lys Lys Ser
        275                 280                 285

Ser Lys Ser Ser Lys Lys Gly Ser Asp Lys Lys Lys Ser Gly Lys His
    290                 295                 300

Val Asp Ser Thr Val Pro Val Phe Asn Leu Glu Asp Ile Glu Glu Gly
305                 310                 315                 320

Val Glu Gly Ala Gly Phe Asp Asp Glu Lys Ser Leu Leu Met Ser Gln
                325                 330                 335

Met Ser Leu Glu Lys Arg Phe Gly Gln Ser Ala Val Phe Val Ala Ser
            340                 345                 350

Thr Leu Met Glu Asn Gly Gly Val Pro Gln Ser Ala Thr Pro Glu Thr
        355                 360                 365

Leu Leu Lys Glu Ala Ile His Val Ile Ser Cys Gly Tyr Glu Asp Lys
    370                 375                 380

Thr Asp Trp Gly Ser Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu
385                 390                 395                 400

Asp Ile Leu Thr Gly Phe Lys Met His Ala Arg Gly Trp Arg Ser Ile
                405                 410                 415

Tyr Cys Met Pro Lys Arg Pro Ala Phe Lys Gly Ser Ala Pro Ile Asn
            420                 425                 430

Leu Ser Asp Arg Leu Asn Gln Val Leu Arg Trp Ala Leu Gly Ser Val
        435                 440                 445
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Glu Ile Leu Phe Ser Arg His Cys Pro Ile Trp Tyr Gly Tyr Ser Gly
450 455 460

Arg Leu Lys Trp Leu Glu Arg Phe Ala Tyr Val Asn Thr Thr Ile Tyr
465 470 475 480

Pro Val Thr Ala Ile Pro Leu Leu Met Tyr Cys Thr Leu Pro Ala Val
485 490 495

Cys Leu Leu Thr Asn Lys Phe Ile Ile Pro Gln Ile Ser Asn Leu Ala
500 505 510

Ser Ile Trp Phe Ile Ser Leu Phe Leu Ser Ile Phe Ala Thr Gly Ile
515 520 525

Leu Lys Met Lys Trp Asn Gly Val Gly Ile Asp Gln Trp Trp Arg Asn
530 535 540

Glu Gln Phe Trp Val Ile Gly Gly Val Ser Ala His Leu Phe Ala Val
545 550 555 560

Phe Gln Gly Leu Leu Lys Val Leu Ala Gly Ile Asp Thr Asn Phe Thr
565 570 575

Val Thr Ser Lys Ala Ser Asp Glu Asp Gly Asp Phe Ala Glu Leu Tyr
580 585 590

Met Phe Lys Trp Thr Thr Leu Leu Ile Pro Pro Thr Thr Leu Leu Ile
595 600 605

Ile Asn Leu Val Gly Val Val Ala Gly Ile Ser Tyr Val Ile Asn Ser
610 615 620

Gly Tyr Gln Ser Trp Gly Pro Leu Phe Gly Lys Leu Phe Phe Ala Phe
625 630 635 640

Trp Val Ile Ile His Leu Tyr Pro Phe Leu Lys Gly Leu Met Gly Arg
645 650 655

Gln Asn Arg Thr Pro Thr Ile Val Val Val Trp Ser Ile Leu Leu Ala
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Val Thr Gly Pro Asp Val Glu Gln Cys Gly Ile Asn Cys
690 695 700

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Ile Asn Ala Asp Glu Asn Ala Arg Ile Arg Ser Val Gln Glu Leu Ser
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Gly Gln Thr Cys Gln Ile Cys Arg Asp Glu Ile Glu Leu Thr Val Asp
        35                  40                  45

Gly Glu Pro Phe Val Ala Cys Asn Glu Cys Ala Phe Pro Val Cys Arg
    50                  55                  60

Pro Cys Tyr Glu Tyr Glu Arg Arg Glu Gly Asn Gln Ala Cys Pro Gln
65                  70                  75                  80

Cys Lys Thr Arg Phe Lys Arg Leu Lys Gly Ser Pro Arg Val Glu Gly
                85                  90                  95

Asp Glu Glu Glu Asp Asp Ile Asp Asp Leu Asp Asn Glu Phe Glu Tyr
            100                 105                 110

Gly Asn Asn Gly Ile Gly Phe Asp Gln Val Ser Glu Gly Met Ser Ile
        115                 120                 125

Ser Arg Arg Asn Ser Gly Phe Pro Gln Ser Asp Leu Asp Ser Ala Pro
    130                 135                 140

Pro Gly Ser Gln Ile Pro Leu Leu Thr Tyr Gly Asp Glu Asp Val Glu
145                 150                 155                 160

Ile Ser Ser Asp Arg His Ala Leu Ile Val Pro Pro Ser Leu Gly Gly
                165                 170                 175

His Gly Asn Arg Val His Pro Val Ser Leu Ser Asp Pro Thr Val Ala
            180                 185                 190

Ala His Arg Arg Leu Met Val Pro Gln Lys Asp Leu Ala Val Tyr Gly
        195                 200                 205

Tyr Gly Ser Val Ala Trp Lys Asp Arg Met Glu Glu Trp Lys Arg Lys
    210                 215                 220

Gln Asn Glu Lys Leu Gln Val Val Arg His Glu Gly Asp Pro Asp Phe
225                 230                 235                 240

Glu Asp Gly Asp Asp Ala Asp Phe Pro Met Met Asp Glu Gly Arg Gln
                245                 250                 255

Pro Leu Ser Met Lys Ile Pro Ile Lys Ser Ser Lys Ile Asn Pro Tyr
            260                 265                 270

Arg Met Leu Ile Val Leu Arg Leu Val Ile Leu Gly Leu Phe Phe His
        275                 280                 285

Tyr Arg Ile Leu His Pro Val Lys Asp Ala Tyr Ala Leu Trp Leu Ile
    290                 295                 300

Ser Val Ile Cys Glu Ile Trp Phe Ala Val Ser Trp Val Leu Asp Gln
305                 310                 315                 320
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Phe Pro Lys Trp Tyr Pro Ile Glu Arg Glu Thr Tyr Leu Asp Arg Leu
325 330 335

Ser Leu Arg Tyr Glu Lys Glu Gly Lys Pro Ser Gly Leu Ser Pro Val
340 345 350

Asp Val Phe Val Ser Thr Val Asp Pro Leu Lys Glu Pro Pro Leu Ile
355 360 365

Thr Ala Asn Thr Val Leu Ser Ile Leu Ala Val Asp Tyr Pro Val Asp
370 375 380

Lys Val Ala Cys Tyr Val Ser Asp Asp Gly Ala Ala Met Leu Thr Phe
385 390 395 400

Glu Ala Leu Ser Glu Thr Ala Glu Phe Ala Arg Lys Trp Val Pro Phe
405 410 415

Cys Lys Lys Tyr Cys Ile Glu Pro Arg Ala Pro Glu Trp Tyr Phe Cys
420 425 430

His Lys Met Asp Tyr Leu Lys Asn Lys Val His Pro Ala Phe Val Arg
435 440 445

Glu Arg Arg Ala Met Lys Arg Asp Tyr Glu Glu Phe Lys Val Lys Ile
450 455 460

Asn Ala Leu Val Ala Thr Ala Gln Lys Val Pro Glu Asp Gly Trp Thr
465 470 475 480

Met Gln Asp Gly Thr Pro Trp Pro Gly Asn Ser Val Arg Asp His Pro
485 490 495

Gly Met Ile Gln Val Phe Leu Gly Ser Asp Gly Val Arg Asp Val Glu
500 505 510

Asn Asn Glu Leu Pro Arg Leu Val Tyr Val Ser Arg Glu Lys Arg Pro
515 520 525

Gly Phe Asp His His Lys Lys Ala Gly Ala Met Asn Ser Leu Ile Arg
530 535 540

Val Ser Gly Val Leu Ser Asn Ala Pro Tyr Leu Leu Asn Val Asp Cys
545 550 555 560

Asp His Tyr Ile Asn Asn Ser Lys Ala Leu Arg Glu Ala Met Cys Phe
565 570 575

Met Met Asp Pro Gln Ser Gly Lys Lys Ile Cys Tyr Val Gln Phe Pro
580 585 590

Gln Arg Phe Asp Gly Ile Asp Arg His Asp Arg Tyr Ser Asn Arg Asn
595 600 605

Val Val Phe Phe Asp Ile Asn Met Lys Gly Leu Asp Gly Leu Gln Gly
610 615 620

Pro Ile Tyr Val Gly Thr Gly Cys Val Phe Arg Arg Gln Ala Leu Tyr
625 630 635 640

Gly Phe Asp Ala Pro Lys Lys Lys Lys Gly Pro Arg Lys Thr Cys Asn
645 650 655

Cys Trp Pro Lys Trp Cys Leu Leu Cys Phe Gly Ser Arg Lys Asn Arg
660 665 670

Lys Ala Lys Thr Val Ala Ala Asp Lys Lys Lys Lys Asn Arg Glu Ala
675 680 685

Ser Lys Gln Ile His Ala Leu Glu Asn Ile Glu Glu Gly Arg Gly His
690 695 700

Lys Val Leu Asn Val Glu Gln Ser Thr Glu Ala Met Gln Met Lys Leu
705 710 715 720

Gln Lys Lys Tyr Gly Gln Ser Pro Val Phe Val Ala Ser Ala Arg Leu
725 730 735

Glu Asn Gly Gly Met Ala Arg Asn Ala Ser Pro Ala Cys Leu Leu Lys
740 745 750

Glu Ala Ile Gln Val Ile Ser Arg Gly Tyr Glu Asp Lys Thr Glu Trp
755 760 765

Gly Lys Glu Ile Gly Trp Ile Tyr Gly Ser Val Thr Glu Asp Ile Leu
770 775 780

Thr Gly Ser Lys Met His Ser His Gly Trp Arg His Val Tyr Cys Thr
785 790 795 800

Pro Lys Leu Ala Ala Phe Lys Gly Ser Ala Pro Ile Asn Leu Ser Asp
805 810 815

Arg Leu His Gln Val Leu Arg Trp Ala Leu Gly Ser Val Glu Ile Phe
820 825 830

Leu Ser Arg His Cys Pro Ile Trp Tyr Gly Tyr Gly Gly Gly Leu Lys
835 840 845

Trp Leu Glu Arg Leu Ser Tyr Ile Asn Ser Val Val Tyr Pro Trp Thr
850 855 860

Ser Leu Pro Leu Ile Val Tyr Cys Ser Leu Pro Ala Ile Cys Leu Leu
865 870 875 880

Thr Gly Lys Phe Ile Val Pro Glu Ile Ser Asn Tyr Ala Ser Ile Leu
885 890 895

Phe Met Ala Leu Phe Ser Ser Ile Ala Ile Thr Gly Ile Leu Glu Met
900 905 910

Gln Trp Gly Lys Val Gly Ile Asp Asp Trp Trp Arg Asn Glu Gln Phe
915 920 925

Trp Val Ile Gly Gly Val Ser Ala His Leu Phe Ala Leu Phe Gln Gly
930 935 940

Leu Leu Lys Val Leu Ala Gly Val Asp Thr Asn Phe Thr Val Thr Ser
945 950 955 960

Lys Ala Ala Asp Asp Gly Glu Phe Ser Asp Leu Tyr Leu Phe Lys Trp
965 970 975

Thr Ser Leu Leu Ile Pro Pro Met Thr Leu Leu Ile Ile Asn Val Ile
980 985 990

Gly Val Ile Val Gly Val Ser Asp Ala Ile Ser Asn Gly Tyr Asp Ser
995 1000 1005

Trp Gly Pro Leu Phe Gly Arg Leu Phe Phe Ala Leu Trp Val Ile Ile
1010 1015 1020

His Leu Tyr Pro Phe Leu Lys Gly Leu Leu Gly Lys Gln Asp Arg Met
1025 1030 1035 1040

Pro Thr Ile Ile Val Val Trp Ser Ile Leu Leu Ala Ser Ile Leu Thr
1045 1050 1055

Leu Leu Trp Val Arg Val Asn Pro Phe Val Ala Lys Gly Gly Pro Ile
1060 1065 1070

Leu Glu Ile Cys Gly Leu Asp Cys Leu
1075 1080